GEOLOGICAL SURVEY OF OHIO
COLUMBUS 10
GEORGE W. WHITE, State Geologist

Report of Investigations No. 1

WAYNESBURG COAL

in

Harrison and Northern Belmont Counties, Ohio

and

Revision of Dunkard (Permian) Boundary

By
GEORGE W. WHITE

Reprinted from the OHIO JOURNAL OF SCIENCE,
Vol. XLVII, No. 2, pp. 55-58, 1947

WAYNESBURG COAL IN HARRISON AND NORTHERN BELMONT COUNTIES, OHIO, AND REVISION OF DUNKARD (PERMIAN) BOUNDARY

GEORGE W. WHITE,
Geological Survey of Ohio

INTRODUCTION

In a study of the Monongahela formation in Harrison County and northern Belmont County it was discovered that the Waynesburg coal is more extensive than formerly known. As the Waynesburg coal is of minable thickness at many places, a map and brief description of the coal may be of value. In addition, as the top of the Waynesburg coal is the dividing plane between the Pennsylvanian and Permian systems of strata, this study provides a modification of the geologic map of the base of the Dunkard (Permian) rocks,[1] especially in Harrison County where no Permian was shown. The map, Plate I, includes parts of the Flushing and St. Clairsville quadrangles of the U. S. Geological Survey, which have been used as a base. The outcrop of the Waynesburg coal is shown by a black line, the measured elevations being indicated. The area shown in green is the area underlain by the coal and that where the surface rocks are Dunkard (Permian) in age. The location of this area in Ohio is shown on an index map, Fig. 1.

The writer's field study in Harrison County and in Belmont County north of the National Road, is a northward extension of the work of Dr. Wilber Stout on the Monongahela formation in the "main field" to the south. Dr. Stout's monographic report in the files of the Geological Survey is being prepared for publication and a discussion of the Monongahela stratigraphy of the area north of the National Road will be added to his report. On Plate I the outcrop line and sections shown south of the National Road and in southeast Colerain Township are from Stout's data. The report and maps of Lamborn[2] have been used for that part of Jefferson County shown on Plate I. The areal reports of Mitchell[3] on Richland Township and of Eberle[4] on Flushing and Wheeling townships were useful and E27 and E21 of Plate I, shown as 161 and 173, respectively, on Plate II are after Eberle.

STRATIGRAPHIC POSITION

The top of the Waynesburg coal is the boundary between the Monongahela formation, of Pennsylvanian age, and the overlying Washington formation of the Dunkard Series of Permian age.[5] The base of the Monongahela formation is the base of the Pittsburgh coal. Sections of the Monongahela formation have been given by Stout[6] and the section at Blaine Hill on the National Highway in N.E.

[1]Stauffer, C. R., and Schroyer, C. R., "The Dunkard Series of Ohio," *Geol. Survey Ohio Bull. 22*, map, p. 12, 1920.

[2]Lamborn, R. E., "Geology of Jefferson County," *Geol. Survey Ohio Bull. 35*, 1930.

[3]Mitchell, R. H., "The Geology of Richland Township, Belmont County, Ohio," unpublished thesis, Ohio State Univ., 1929.

[4]Eberle, R. F., "The Geology of Wheeling and Flushing Townships, Belmont County, Ohio," unpublished thesis, Ohio State Univ., 1936.

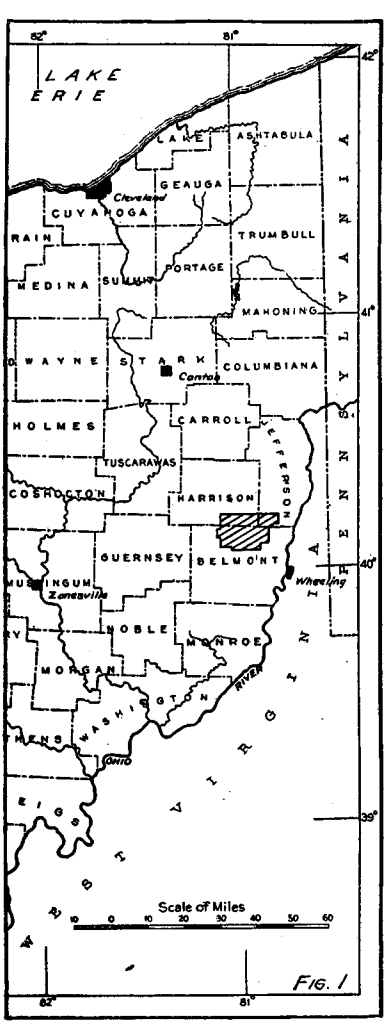
[5]White, I. C., "Stratigraphy of the Bituminous Coal Field of Pennsylvania, Ohio, and West Virginia," *U. S. Geol. Survey Bull. 65*, p. 41, 1891.

Stauffer and Schroyer, *op. cit.*, pp. 9–11.

[6]Stout, W., "The Monongahela Series in Eastern Ohio," *Proc. W. Va. Acad. Sci.*, Vol. 3, pp. 118–133, 1930.

Idem, "Generalized Section of the Coal-Bearing Rocks of Ohio," *Geol. Survey Ohio Inf. Circ. No. 2*, 1939.

Sect. 21, Richland Township, Belmont County, has been described by the writer[7] and is shown (in part) graphically in 187, Fig. 2. According to Stout[8] the top of the Waynesburg coal in Belmont County (not including measurements from the central northern and northwestern parts) lies on the average 253 feet above the base of the Pittsburgh coal, 162 feet above the Meigs Creek coal, 103 feet above the Fulton green shale, and 50 feet above the Uniontown coal. At the Blaine Hill section (Fig. 2), these intervals are smaller but not significantly so, being 240½,



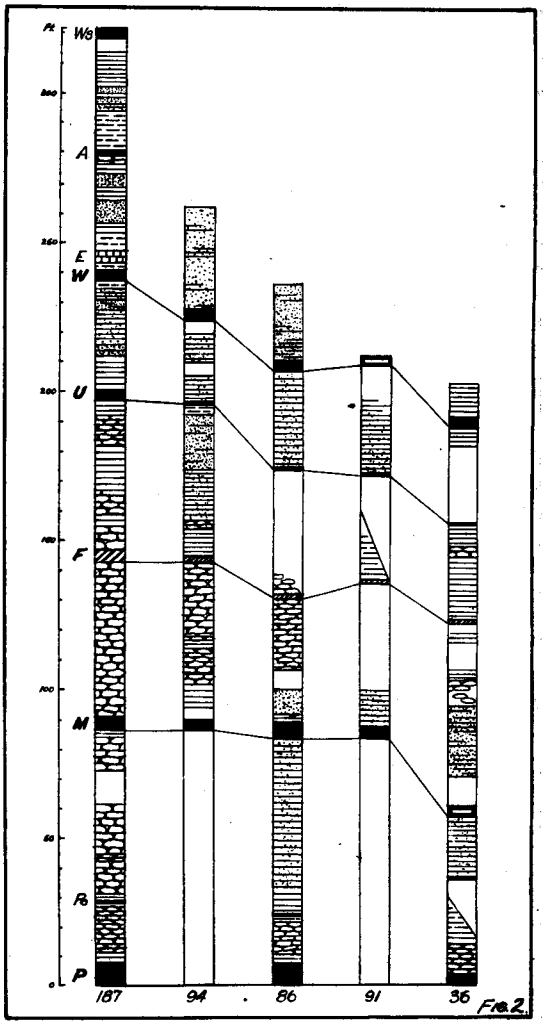


FIG. 1. Map of eastern Ohio showing location of area.

FIG. 2. Columnar sections of strata. Locations of sections shown on Plate II and given in text. Key: P, Pittsburgh coal; Po, Pomeroy coal; M, Meigs Creek coal; F, Fulton green shale; U, Uniontown coal; W, Waynesburg coal; E, Elm Grove limestone; A, Waynesburg "A" coal; Ws, Washington coal.

[7]White, G. W., "Upper Pennsylvanian and Lower Permian Rock Section at Blaine Hill, Belmont County, Ohio," *Ohio Jour. Sci.*, Vol. 45, pp. 173–179, 1945.

[8]Stout, "Monongahela Series. . . . ," *op. cit.*, p. 121.

154½, 98, and 44½ feet respectively. Northward, in Colerain Township, the intervals are essentially similar to those at Blaine Hill. Farther northward, in Sect. 11, Mt. Pleasant Township, Jefferson County,[9] the Waynesburg is 224 feet above the Pittsburgh and 142 feet above the Meigs Creek. To the northwest of Blaine Hill, in southeastern Harrison County, in W. Sect. 4 and N. Sect. 11, Short Creek Township (94 and 86, Plate I, and Fig. 2) the intervals are reduced. In W. Sect. 28 of the same township the Meigs Creek-Waynesburg interval is similar (91, Fig. 2, three-eighths mile south of 179 of Plate I). Farther west, in N.E. Sect. 17, Athens Township, Harrison County (36, Plate I, and Fig. 2), the intervals are still less. Here the Waynesburg lies closer to the Pittsburgh coal than does the Uniontown at Blaine Hill. An analysis of Fig. 2 shows that the reduction in the Waynesburg-Pittsburgh interval from Blaine Hill northward is due solely to a lessening of the Waynesburg-Meigs Creek interval, and that the further reduction westward is due to a decrease of the Meigs Creek-Pittsburgh interval.

ELEVATION AND STRUCTURE

The Waynesburg coal outcrops at elevations ranging from 1,290 feet in Sect. 17, Athens Township, Harrison County, to 1,000 feet in Sect. 10, Colerain Township, Belmont County (Plate I). The general direction of dip is east-southeast, with local variations. The dip is only a few feet per mile in the northwestern part of the area but may reach 30 feet or more per mile in the southwestern part. As shown on the map, the member is found only in small areas on hill and ridge tops in the western and northern parts of the region, but is much more extensive and nearer the valley bottoms in the southeastern part.

THICKNESS AND CHARACTER

Within the region under discussion the Waynesburg coal varies in thickness from a few inches to almost 5 feet. Over considerable areas the thickness is 3 to 3½ feet. Plate II shows the thickness of the coal at each place designated by the corresponding stratigraphic section number of the map, Plate I.

The Waynesburg coal is a bright, banded, bituminous coal. This coal almost everywhere has one or more partings, which may be either clay shale or carbonaceous shale. The lower half of the bed usually, but not always, has more of these partings than the upper half. Partings are most numerous in Short Creek Township, Harrison County. In Flushing and Kirkwood townships, Belmont County, the upper part of the bed consists of carbonaceous shale rather than coal.

The Waynesburg coal in Mt. Pleasant Township, Jefferson County, has been described by Lamborn[10] as weathered blossom from 2 ft. 6 in. to 2 ft. 10 in. in thickness. It is probable that under cover the Waynesburg coal in parts of this township is 3 feet or more in thickness.

A sample of Waynesburg coal[11] was taken in 1927 by the writer and P. E. Fitzgerald from the local mine of A. B. Shields, S.W. ¼ Sect. 36, Colerain Township, Belmont County (B34, Plates I and II). Analysis by D. J. Demorest:

		Ft.	In.
Sandstone, massive.			
Sandstone, shaly		0	3
Coal, good, sampled	*Waynesburg*	3	1
Shale, dark, rejected		0	1½
Coal, good, sampled		0	9½
Shale, with pyrite bands, rejected		0	⅜
Coal, bony, rejected		0	2
Shale, gray, soft.			

[9]Lamborn, *op. cit.*, p. 33.

[10]Lamborn, *op. cit.*, pp. 252–253.

[11]Bownocker, J. A., and Dean, E. S., "Analyses of Coals of Ohio," *Geol. Survey Ohio Bull. 34*, p. 277, 1929.

Proximate analysis	As received	Moisture free
Moisture	5.27	0.00
Volatile matter	37.42	39.50
Fixed carbon	42.61	44.98
Ash	14.70	15.52
	100.00	100.00

Ultimate analysis	As received	Moisture free
Carbon	64.45	68.04
Hydrogen	4.97	4.62
Oxygen	12.25	7.99
Nitrogen	1.44	1.52
Sulphur	2.19	2.31
Ash	14.70	15.52
	100.00	100.00

Air drying loss 2.3 per cent.

		As received	Moisture free
Heating value	Calories	6,434	6,792
	B. t. u.	11,581	12,225
Fusion of ash	Incipient	2,583° F.	
	Complete	2,635° F.	

Ten other analyses of the Waynesburg coal[12] from Belmont County east and south of the region here discussed show this coal (as received) ranging from 1.78 to 5.72 moisture; 35.32 to 40.07 V. M.; 39.70 to 45.89 F. C.; 13.07 to 16.87 ash; 1.75 to 4.91 S.; and 11,000 to 12,020 B.t.u. From the analysis from Colerain Township the coal is high volatile bituminous B but close to the A range,[13] into which range falls at least one sample of Waynesburg coal,[14] that from central Sect. 36, Richland Township, Belmont County, (1• mile S.E. of S209, Plate I), just south of the region here discussed.

The roof of the Waynesburg coal is at most places shale, often sandy and ferruginous. In Harrison County the shale becomes more sandy upward and a few feet above the coal may pass into shaly sandstone. In much of Belmont County the roof material is shale, grading upward to shaly sandstone. In the eastern margin of the region from one to several feet of clay shale overlies the coal, the shale being overlain by the dense Elm Grove limestone,[15] which, however, is replaced by sandstone at places. On the whole, roof conditions for mining may be considered fair to good, except where the coal is under shallow covering and weathering has affected the roof strata.

The material beneath the coal is gray clay shale, at places having the appearance of a very impure fire clay. In thickness the clay shale varies from a few inches to several feet, 2 feet being about average. Below the clay shale is shale of coarser grain. Unless abnormally wet conditions obtained the material beneath Waynesburg coal should satisfactorily support mine props and tracks.

USE AND RESERVES

In Harrison County the Waynesburg coal has been mined in a small way on the farm of F. M. Price, W. Sect. 11, Short Creek Township (88, Plates I and II). The coal is reported to burn well in stoves, with considerable ash but without clinkers. The coal was mined many years ago in a small way on the north edge of Harrisville but the mine has long since been abandoned. No other use of the coal in Harrison County is known.

In Belmont County the coal has been mined in a few small operations for household use, all now inactive, in Colerain and Richland townships, and in other townships east and south of the region here discussed. With the exception of the removal of a very small amount of coal from these minor operations, the entire area of the Waynesburg coal shown in Plate I is part of the coal reserve of Ohio.

[12] *Ibid.*, pp. 277–283, 327–328.

[13] Fieldner, A. C., and others, "Classification Chart of Typical Coals of the United States," *U. S. Bur. Mines Rept. Inv. 3996R*, pp. 3, 5, 1939.

[14] Bownocker and Dean, *op. cit.*, pp. 277–278.

[15] White, G. W., *op. cit.*, p. 176.

MAP SHOWING OUTCROP AND EXTENT OF WAYNESBURG COAL IN HARRISON NORTHERN BELMONT AND SOUTHWESTERN JEFFERSON COUNTIES OHIO

1070 Elevation of outcrop of Waynesburg coal.

(190) Location of section shown on Plate 2 measured by G. W. White.

(S212) Location of section measured by W. Stout.

Scale

1 ½ 0 1 2 3 4 Miles

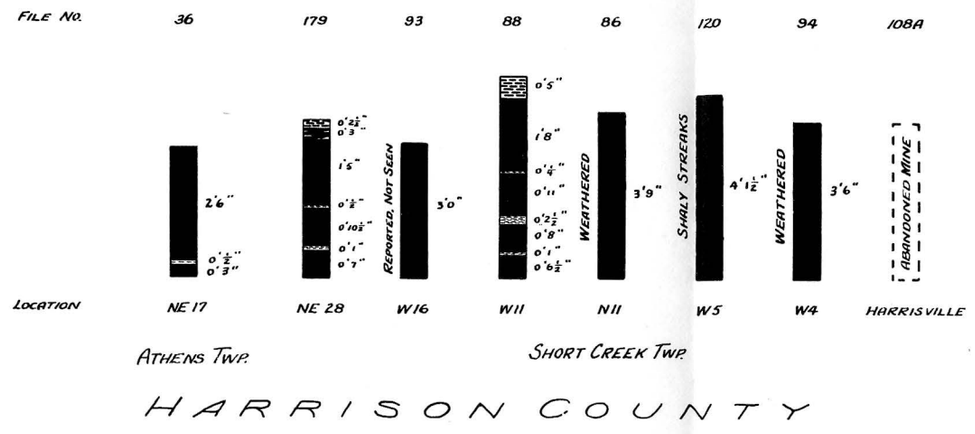
1 ½ 0 1 2 3 4 5 Kilometers

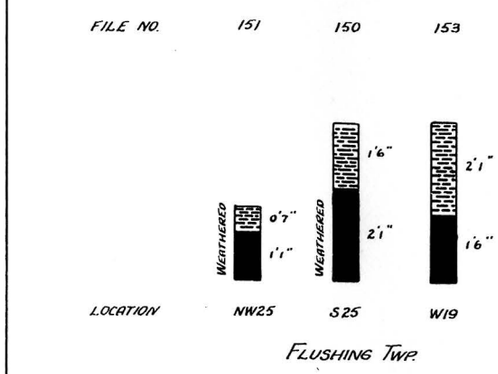
Contour interval 20 feet.

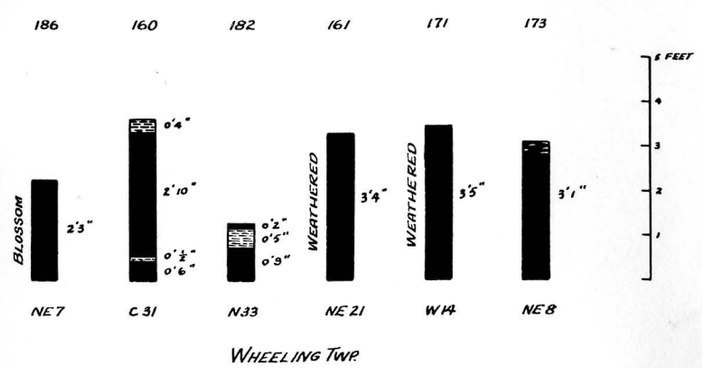
GEOLOGICAL SURVEY OF OHIO
1946

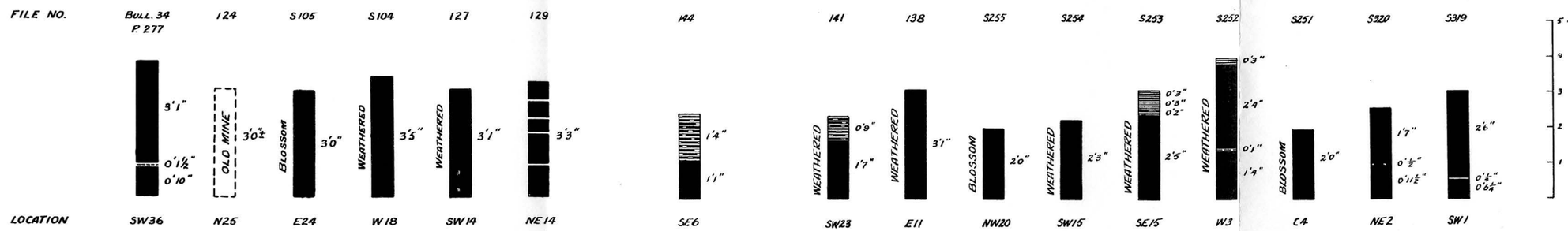
Plate 1

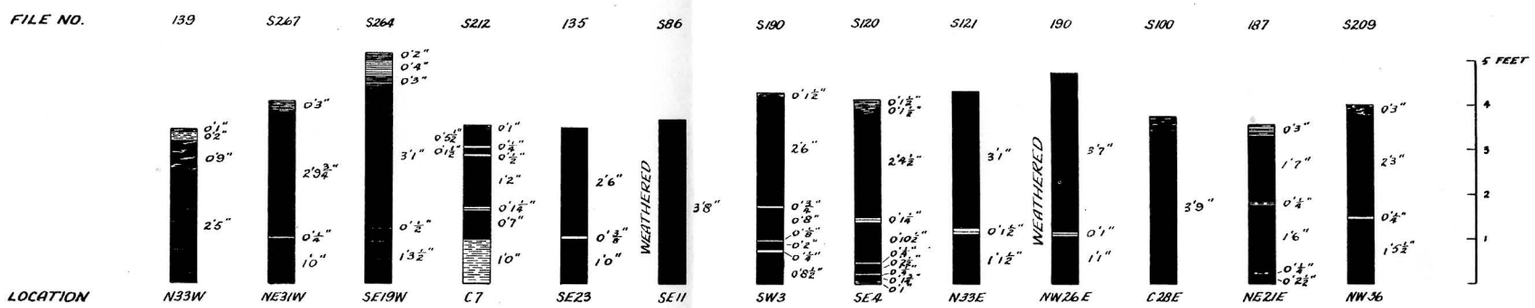
LBP











EXPLANATION

- Coal
- Shaly or Bony Coal
- Carbonaceous Shale
- Shale

Locations shown by file number on map Plate I

GEOLOGICAL SURVEY OF OHIO
1946

SECTIONS OF WAYNESBURG COAL IN HARRISON AND NORTHERN BELMONT COUNTIES

LBP

Plate II